

forced on him that it is to Germany he must go for his goods.

And the conviction is strengthened by the organisation provided for giving information as to the goods exhibited. The German exhibit is under the skilled care of Dr. Robert Drostén, with some three or four scientific assistants. One or more of these gentlemen is always ready to give information about special instruments. When I visited the exhibition I asked for a catalogue, and inquired if I could examine more closely certain special instruments. By all means, was the reply, and Herr Drostén gave me several hours of his time opening cases, taking apparatus out, looking up special catalogues, and loading me with information. At the end of this time we were both tired, and he suggested that if I found, on looking over the catalogue and my notes, that I had omitted anything, I should come again. I returned next morning, and spent nearly as long a second time.

Or take, again, my own experience with the splendid exhibit of comparators and dividing engines of the Société Genevoise des Instruments de Précision.

There was a notice in the case that M. Schwartz, at the Bureau, would give information. On asking for M. Schwartz, and explaining that I wished to examine certain things with care, he came at once, opened the cases, and answered my many questions in the most courteous manner; some information which I wanted as to certain instruments not made by the Society he could not give me. It has since been sent me, at his request, from Switzerland.

So also with some American measuring and testing apparatus; the cases were opened, and I was allowed to handle the apparatus; one gentleman gave me a very full demonstration of the use of a new testing machine, which combines a multitude of ingenious devices.

Contrast this with the English exhibit; a courteous commissionaire was, when I saw it, in charge of the whole; there were some notices as to where to apply for price lists of some of the firms exhibiting; the nearest approach to a catalogue was a set of cards hung on the wall relating to the excellent exhibit of the Scientific Instrument Company. These I found of real value, but they could not be carried away for reference.

Again the same conclusion is forced home; the Germans have organised their exhibit and are far ahead; few, if any, of the English firms will profit through the exhibition by an increase in their trade; German trade must grow as a result of a show which has been visited by thousands of men of science. The 700,000*l.* of 1898 will rapidly increase.

And why should this be so? Is it our insular ignorance and our unreadiness? In everything, this great exhibition shows the advance of our continental rivals. It is probably true that, in the special circumstances of the exhibition, many prominent firms declined to exhibit. The results will prove conclusively that they made a mistake. Why should I exhibit? said one manufacturer; last time I sent the best of my goods and won a prize, and the French immediately put on heavy duties against them. It is an argument that may have some weight, but does not apply forcibly to scientific apparatus; besides, the French are not the only customers. No; the reason lies deeper. British pluck and doggedness, the individual skill of the British workman, which, on the average, is far above that of his foreign *confrère*, the traditions of British ascendancy in the past, can all do much, but we have not realised—shall we realise them in time?—the efforts our continental rivals are making to rob us of that ascendancy. It is true, as a recent writer in the *Westminster Gazette* puts it, speaking of trade with South Africa, that

"We must be prepared to face the truth that, unless the British manufacturer bestir himself for the supply of this great African community, a great deal of business

which, in the natural course of events, should go to him will certainly have to be diverted to Germany and America."

The first step towards curing the disease is to recognise its presence; and how slow we are to do that.

The German catalogue and the exhibit are striking evidences of the services rendered to German trade by the Reichsanstalt.

"The greatest share of the impetus given to the manufacture of scientific instruments," says the catalogue, "is due to the Imperial Physical and Technical Institute. . . . This institution has already done great service, and a large proportion of recent progress is due to its stimulating and helpful influence."

An inspection of the exhibit fully bears this out. We in England have for some time past hoped that the National Physical Laboratory would do for English science all the Reichsanstalt has done for Germany.

It is now two years since the Treasury accepted generally the conclusions of the report of Lord Rayleigh's Committee on the establishment of such a laboratory, and one year since the first meeting of the General Board, and for months the whole scheme has been at a standstill because certain of our rulers attach more weight to the protests of some who object to the selected site than to the deliberate opinion of those whom they have invited to organise and control the laboratory.

It is admitted that the establishment of the laboratory is of national importance. Various difficulties are allowed to delay its erection; meanwhile the Germans go ahead.

Up to the middle of the century our methods were sufficient; that condition of things has ceased. The organised application of science and scientific methods to trade and commerce, indeed to all the affairs of life, is absolutely essential if we are to continue to prosper. Will England realise this truth before it is too late?

NOTES.

THE evening discourses at the meeting of the British Association at Glasgow next year will be given by Mr. Francis Darwin, F.R.S., and Prof. W. Ramsay, F.R.S. The lecture to working men will be delivered by Mr. H. J. Mackinder.

HUXLEY's life and work is an inspiring subject for a lecturer, and Lord Avebury had no difficulty in interesting the audience which assembled at the Museum of Practical Geology on Tuesday to hear him discourse upon it. The address was the first of the annual lectures established by the Anthropological Institute in memory of Huxley; and as Lord Avebury was a close and intimate friend of the master, he very appropriately inaugurated the series. Readers of *NATURE* are familiar with a large part of Huxley's work, but a few points mentioned by Lord Avebury will bear repetition. Huxley's Friday evening lectures at the Royal Institution rivalled those of Tyndall in interest and brilliancy; yet he said himself that at first he had almost every fault a speaker could have. He was one of the foremost of those who brought people to realise that science is of vital importance in their lives, that it is more fascinating than a fairy tale and more thrilling than a novel, and that any one who neglects to follow the triumphant march of discovery, so inspiring in its moral influence and its revelations of the beauties and wonders of the world, is deliberately rejecting one of the greatest interests and comforts of life. Apart from his professional and administrative duties, Huxley's works fall into three principal divisions—science, education and metaphysics. Of his contributions to science the Royal Society's catalogue enumerates more than one hundred, and every one of them, in the words of Prof. Parker, "contained some brilliant generalisation, some new and fruitful way of looking at the facts." The value of his

services to education cannot be over-estimated. He maintained that no boy or girl should leave school without possessing a grasp of the general character of science, and without having been disciplined more or less in the methods of all sciences. As regards higher education, he was a strong advocate for science and modern languages, though without wishing to drop classics. There were two things which he said he really cared about—one was the advance of natural knowledge, and the other the bettering of the condition of the masses of the people. How well he furthered both scientific and national progress is known to all of us.

PROF. A. CALMETTE, director of the Pasteur Institute at Lille, who is giving the Harben lectures this year, at the Examination Hall of the Royal College of Physicians and Surgeons, has taken the plague as his subject. In his first lecture, delivered on November 7, he pointed out that plague now menaces all the maritime nations of the globe, and it has become necessary to take rigorous measures to stop its extension. The progress of hygiene and the knowledge acquired during the last five years on the etiology, treatment and prophylaxis of the affection enables it to be combated very efficaciously and its centres to be rapidly circumscribed. It is known that the plague bacillus is found in the buboes and sputa of the patient, that it is also frequently found in the blood, that it has the form of a short bacterium, slightly ovoid, that it is easy to stain by the ordinary laboratory methods, and that it can be cultivated on the usual media. Mice, rats and guinea-pigs show the greatest susceptibility to plague. It has long been remarked that in localities where the plague appears mice and rats die in great numbers, and from the most ancient times, and even to-day, the Chinese and nomadic peoples inhabiting the northern slopes of the Himalayas, so soon as they notice an abundance of dead rats, remove elsewhere to avoid the epidemic they know must be at hand. Of other animals the pig and ox are said to be subject to the plague, but observations show that they cannot take the disease, at least spontaneously. Nor can birds easily contract it; the vultures that devour the corpses of the plague-stricken in the Towers of Silence in the suburbs of Bombay suffer no ill after their funereal repast, though they may distribute plague microbes through their excreta. A monkey was found to contract the plague spontaneously when placed in a cage side by side with another monkey; in this and similar cases the infection was apparently carried by flies or by fleas and other parasites of the skin.

IN connection with the International Exposition at Paris, a number of balloons recently ascended from Vincennes with the object of testing which could remain in the air for the longest period. *La Nature* gives the following results:—Count Henri de la Vaulx descended, after a journey lasting 35h 45m., at Korostichew, in Russia, the distance from the starting-point being 1925 kilometres, and the greatest altitude 5700 metres. M. Jacques Balsan descended after a voyage of 27h. 5m., having attained a maximum altitude of 6540 metres, and reached a distance of 1345 kilometres from the starting-point. M. Jacques Faure descended in Germany, 950 kilometres from the starting-point, after a journey of 19h. 24m. Upon these results, and those of previous contests, the grand prize in aeronautics has been awarded to Count Henri de la Vaulx.

M. DE FONVILLIE informs us that Dr. Janssen has asked the Aero-Club at Paris to organise a series of three balloon ascents on the nights of Tuesday, Wednesday and Thursday of this week, in order to see whether the Leonids make an appearance or not.

A PAN-AMERICAN EXPOSITION will be held at Buffalo, New York, from the beginning of May to the end of October next year. There will be a large building for electrical exhibits, and

in it will be the service plant, for the transformation and distribution of the 5000 horse-power transmitted from Niagara Falls, for lighting and power purposes; a collective exhibit of historical interest, containing illustrative models and apparatus showing important advances in the art; and the commercial exhibit, showing articles possessing distinctive merit, whether consisting of workmanship, novelty or usefulness.

THE opening meeting of the new session of the Society of Arts, the 147th since the foundation of the society in 1754, will be held on Wednesday evening, November 21, when an address will be delivered by Sir John Evans, K.C.B., F.R.S., vice-president and chairman of the Council. For the meetings previous to Christmas the following arrangements have been made:—November 28, Major Ronald Ross, "Malaria and Mosquitoes;" December 5, Prof. H. S. Hele-Shaw, F.R.S., "Road Traction;" December 12, Prof. Frank Clowes, "The Treatment of London Sewage."

AT a recent meeting of the committee of the Liverpool School of Tropical Medicine it was unanimously resolved to invite Dr. R. Fielding Ould, Dr. Balfour Stewart and Dr. A. S. Grünbaum to become assistant lecturers. These gentlemen have already assisted the work of the school in many different ways. On the motion of Mr. Alfred L. Jones it was resolved that the best thanks of the school are due to Drs. Annett, Dutton, and Elliot for their very valuable services in West Africa whilst members of the second malarial expedition of the school. These gentlemen have just returned, bringing with them a quantity of valuable material for future work.

RENEWED interest in the mosquito theory of the propagation of yellow fever, propounded by Dr. C. I. Finlay, of Havana, is aroused by a paper read at the recent meeting of the American Public Health Association at Indianapolis, by Surgeon Walter Reed and Assistant-Surgeons J. Carroll, A. Agramonte and J. W. Lazear. From experiments and observations made in Cuba, in the course of which Dr. Lazear died from yellow fever apparently conveyed to him by an infected mosquito, the following conclusion is arrived at:—"The mosquito serves as the intermediate host for the parasite of yellow fever, and it is highly probable that the disease is only propagated through the bite of this insect."

THE *Times* states that the whaler *Eclipse*, which arrived at Dundee on November 7 from Davis Strait, landed Dr. Leopold Kann, who has for eighteen months been connected with a scientific expedition to the Arctic regions. The expedition, which consisted of Dr. Kann, Mr. Robert Stein, of Washington, U.S.A., and a Boston taxidermist named Mr. S. Warmbath, left Sydney, Nova Scotia, in July 1899, on board the Peary relief ship *Diana*. The Peary expedition was seen in the beginning of August 1899, in three divisions. At that time Lieutenant Peary had been badly frostbitten, having lost several toes, and being only able to walk with difficulty. The party, which had a large number of sledges and Eskimo dogs, was determined to make a dash for the North Pole.

ARRANGEMENTS have been made for the issue, by the Cambridge University Press, of a journal devoted to the publication of the best original work on hygiene. The periodical will be entitled *The Journal of Hygiene*, and will be issued quarterly. It will be edited by Dr. G. H. F. Nuttall, in conjunction with Dr. John Haldane, F.R.S., and Dr. Arthur Newsholme. The scope of the new journal will be similar to that of the *Archiv für Hygiene* and *Zeitschrift für Hygiene*, and the aim will be to become the chief medium for original workers in hygiene among English-speaking people. The first number of the journal will appear on January 1, 1901.

IN several parts of Germany considerable attention is being paid to electrical appliances that can be used on the farm. Mr. Hughes, U.S. Consul at Coburg, reports that near Ochsenfurt, in Bavaria, a company, composed of land-owners and small farmers, has been organised for the establishment of an electrical system for use on their farms and in villages. The power is to be generated by steam and water, and the current to be distributed from a central station to the places at which it is wanted. Sub-stations are to be established at given points, with the necessary apparatus for connecting with the farm or other machinery, and also for lighting purposes in the houses, offices, roads, and village streets.

FROM the U.S. *Experiment Station Record* (vol. xii., No. 1), we learn that an interesting step, looking to the advancement of agriculture in the Russian Empire, has recently been taken, on the recommendation of the Ministry of Agriculture and Imperial Estates, in the inauguration of a system of commissioners of agriculture to preside over the agricultural affairs in their respective provinces or governments, and to seek to promote and improve the agricultural conditions in general. Provision has been made for such commissioners in twenty different governments of the Empire, and the funds for their maintenance became available with the beginning of the present year. These commissioners will have charge of all public measures relating to agriculture and rural affairs, and will exercise supervision over all local agricultural institutions maintained by the government. They will inquire into the agricultural needs of their respective governments, and will recommend government aid for such local or private enterprises as merit special encouragement. Connected with the commissioners' offices will be corps of agricultural specialists and instructors, who will be assigned to the work by the Ministry of Agriculture and Imperial Estates. They will go out among the landowners and peasants for the purpose of collecting data regarding the actual conditions of various branches of agriculture, to diffuse general information on agricultural topics, and endeavour to improve the methods and practices in vogue. The inauguration of this system would seem to be a distinct mark of progress. Taken in connection with the recent decrees regarding the establishment of additional agricultural experiment stations and systems of agricultural education, already referred to, it should materially improve and modernise the practice of agriculture in Russia.

A SIMPLE method of recording the speed of motor cars and other vehicles has been devised by M. L. Gaumont, and accounts of the device appear in *Cosmos* and *La Nature* of November 3. The instrument consists simply of a camera with a double shutter, by which two exposures are made of the same plate, separated by a known interval of time. On developing the photograph two images are obtained of the moving object, and, by measuring the distance between them, the dimensions of the car being supposed known and also measured on the plate, it is easy to calculate the speed of the car at the instant when the photograph was taken. The object is to assist the authorities in regulating the speed of these vehicles and checking furious driving.

THE Cancer Society has just issued its annual report, from which we learn that one of the great aims of the Society has been to direct public attention to the insidious danger threatening in the increase of cancer. During the past year the Committee have sent out Dr. Arthur C. Duffey to the United States to report on the equipment of the newly-erected Cancer Laboratory at Buffalo, and on his return a detailed report was issued to all the medical schools and to the Press. A prize of fifteen guineas, offered by Miss Scott for the best original essay on the present state of cancer science, has been awarded to Dr. Alexander Fraser, of Manchester. An elementary pamphlet by

Dr. Herbert Snow, laying down maxims for the avoidance and early recognition of cancer, has been issued, together with numerous other publications bearing on the subject.

DR. QUIRINO MAJORANA contributes to the *Atti dei Lincei* an account of experiments dealing with the behaviour of carbon at high temperatures and pressures. In M. Moissan's experiments on the transformation of diamonds, the partial crystallisation of the carbon was attributed to (1) the high temperature of the central mass, (2) the solubility of the carbon in the metallic mass, and (3) the pressure. Dr. Majorana, finding that in his previous experiments the crystals obtained were much smaller than those produced by Moissan, has conducted a fresh series of experiments in which he has maintained the carbon at a pressure exceeding, and a temperature equalling, that employed by Moissan, for a considerably longer period of time, without producing so marked an increase of density. From this he considers it probable that the solubility of the carbon in the surrounding medium is one of the principal factors in the crystallisation.

A SERIES of papers dealing with the properties of pozzolana, and its use in mortars and cements exposed to the action of sea-water, is contributed to the *Gazzetta chimica italiana* by M. O. Rebuffat. In one of these papers the author discusses the reactions of the several silicates of alumina entering into the composition of pozzolana, with especial reference to the production of artificial cements of this character. In connection with the action of sea-water, the principal results are that sea-water transforms the cement of mortars containing pozzolana into a hydrated silicate of alumina containing small quantities of lime and magnesia and quantities not negligible of alkalis. The silicate, by its composition, is altogether unaffected by the salts of sea-water. Seeing that in mortars immersed in sea-water the lime, after binding the mortar together, ultimately disappears completely, the use of mixtures of cement and pozzolana is not recommended. The author advocates the old plan of screening the pozzolana, and deprecates the use of finely ground pozzolana mixed with sand.

PROF. R. SISSINGH, of Amsterdam, has published a short treatise on the general properties of images formed by direct pencils traversing a system of spherical surfaces. This treatise contains a simplification of the proofs applicable to an optic system formed of lenses centred on the same axis. The theory now offered is essentially physical in character; at the same time, the ordinary geometrical properties of images are also established, and the optical properties of the eye are considered. Prof. Sissingh takes no account of aberration other than chromatic aberration. The monograph is reprinted from the *Verhandelingen* of the Royal Academy of Amsterdam, and published by Johannes Müller, of Amsterdam.

WE have received from Sir Charles Todd, Government Astronomer of South Australia, a report upon the Rainfall of the Colony during 1897, showing the monthly and yearly values at 415 stations, together with the number of days on which rain fell, the greatest fall in one day, and the mean of the rainfall for a number of previous years. The rains during the year were irregular and, on the whole, below the average over the whole colony; in October a dry spell set in, which lasted during the rest of the year, and practically ruined the agricultural prospects. As an instance of the lengthy drought to which places in the interior are subject, Charlotte Waters in 1896 had 2.84 inches only, and 1.16 inches in 1897. A valuable table is given, showing the yearly rainfall at Adelaide for 59 years from 1839 to 1897, and the years when the amount was above or below the general average (20.886 inches) for the whole period.

WE learn from the U.S. *Monthly Weather Review* that the Russian Meteorological Office has published a comprehensive meteorological atlas, to commemorate the fiftieth anniversary of the foundation of the Central Physical Observatory by the Emperor Nicholas I. on April 1, 1849. It contains eighty-nine charts and fifteen graphical tables, and exhibits the prominent features of the climate of the Russian Empire from Warsaw on the extreme west, to Bering Strait on the east, and from Teheran on the south, to the Arctic Ocean. This range of 40° of latitude and 160° of longitude represents one of the most extensive meteorological systems in the world. The mean values of all the principal elements are exhibited in monthly and annual charts, the rainfall being shown for seasons. One of the charts shows the number of days during which snow lies on the ground; the region of the maximum number of days (190) extends from Archangel east-south-eastward beyond the Ural. From this region the number of days diminishes until we reach sixty days on the northern shores of the Caspian Sea, and twenty days on the north-western shores of the Black Sea. The paths of cyclones and types of weather in Russia, in so far as the latter depend on barometric conditions, are shown by five charts. The whole work is pronounced by the U.S. Weather Bureau to be a magnificent production, and illustrative of the activity of this vast meteorological service.

THE *American Museum Journal*, of which we have received the third part, appears to be a publication well worth the attention of museum authorities in other countries. It is issued monthly, and is stated to be a popular record of the progress of the American Museum of Natural History; the present part, which is well illustrated, containing fifteen pages of text. The first article is an obituary notice of the late Mr. J. M. Constable, the Vice-President of the museum. This is followed by a record of recent donations to the library, and this again by a reference to an exhibit displaying the fauna of New York, which has been recently added to the museum and appears to have attracted much attention from the public. Other articles describe the development of the museum, the work and progress of the Department of Public Instruction, and the work which has been recently accomplished in the anthropology of the Pueblo and Cave-dwelling Indians of New Mexico and the adjacent territories.

THE feature of the *Entomologist* for November is the continuation by Dr. Max Standfuss of the account of his experiments in hybridisation among the Lepidoptera, and the effects of temperature on those insects; the paper being illustrated by a plate of abnormally coloured butterflies. As regards these abnormalities (several of which occur occasionally in nature) produced by temperature variation, the author considers that they are not atavistic. A large proportion of them are infertile, and the majority of those which bred produced normal offspring, only the most abnormal female transmitting more or less of its newly acquired characters to its progeny. Although the experiments, on account of disease, were incomplete, their result, so far, seems to demonstrate that the possibility of perpetuating the abnormalities depends on the degree to which these depart from the ordinary form.

THE *Transactions* of the New Zealand Institute for 1899 contains thirteen papers on zoology, seven on botany, and five on geology, the great majority relating to the colony itself. Of especial interest is the record, by Prof. Benham, of the occurrence of a species of *Balanoglossus* in New Zealand waters, while a note on the freshwater crayfishes of the colony, by Dr. C. Chilton, will attract the attention of students of the crustacea. The practical extermination of the great purple coot (*Notornis mantelli*) is attributed by Mr. R. Henry very largely

to rats, which, by eating the wild grain and seeds, prevent the bird from obtaining its proper nutriment. It will be news to many ornithologists that, about twenty years ago, the ship *Gleaner* came into Greymouth with a strange bird on board which turned out to be either the New Zealand or the Australian giant coot, and had reached the vessel at a distance of 400 miles from the shore. These birds were supposed to be practically incapable of flight.

WE have received from the U. S. Department of Agriculture, No. 19 of the "North American Fauna," which describes the results of a biological reconnaissance of the Yukon river region. The memoir is divided into three sections, of which the first is devoted to a general account of the region, while the second and third respectively treat of the mammals and the birds. For the latter Dr. L. B. Bishop is responsible, the two former sections being the work of Mr. W. H. Osgood. Although the whole area belongs to what American writers term the boreal zone, it has been found possible to divide it into several formal districts, the *tundra* being assigned to the Arctic province, while the Yukon Valley itself comes mainly within the Hudsonian division, but also contains a distinct Canadian element. In addition to several which have been described a short time previously, the memoir notices three birds and nine mammals which are regarded as new. It seems, however, pushing refinements of distinction a little too far to regard the two forms of reindeer met with in Alaska, as well as the elk, as distinct species.

PART II. of vol. lxxviii. of the *Zeitschrift für wissenschaftliche Zoologie*, which has just reached us, contains two papers; one, by Herr Samter, an elaborate dissertation on the development of the crustacean *Leptodora hyalina*, the other, by Herr S. Metalnikoff, an account of the anatomy and histology of the worm *Sipunculus nudus*. Both communications are exquisitely illustrated.

TO the August number of the *Journal* of the Bombay Medical and Physical Society, Dr. N. F. Surveyor contributes an illustrated account of the parasitic invasions to which the eggs of the cockroach are subject. These include two Hymenoptera, several kinds of moulds, probably several beetles, possibly another cockroach-like insect, and the parent itself. The importance of the subject will be apparent when it is stated that several of the parasites of the cockroach may pass a portion of their existence within the body of man himself.

IT has been shown by Dr. C. L. Griesbach, the Director of the Geological Survey of India, that the Trias of the Himalaya contains several well-marked horizons of Cephalopods not only in the Muschelkalk, but above and below it. The rich series of specimens collected in recent years has been submitted to Dr. Edmund Mojsisovics of Vienna, and he has written an elaborate memoir on the Upper Triassic species ("Palæontologia Indica," Ser. xv. Himalayan Fossils, vol. iii, part I., 1899). This memoir has been translated into English for the Indian Survey by Dr. and Mrs. A. Foord. The main portion of the work is naturally devoted to a description of the species, which are ranged under genera, whose characteristics can be understood only by those palæontologists who devote particular attention to the subject. Among the genera familiar when General Strachey first discovered Triassic fossils in the Himalaya, *Ceratites*, *Nautilus* and *Orthoceras* alone appear, but a host of others, needful to express the results of modern discrimination, find place in the volume. Of most interest to geologists are the general results arrived at by Dr. Mojsisovics. He refers to the local character of the Indian Upper Triassic fauna, but observes that there can be no doubt of the former existence of an open connection of the sea between the Indian and Mediterranean provinces. The Indian Trias province forms an integral part of

the "Thetys," or great Trias sea, named by Ed. Suess, which extended from the Mediterranean eastwards through Central Asia, and included the Germanic shallow sea. Some remarks are also made on the Arctic-Pacific Trias Province.

THE geology of Bad Nauheim and its thermal salt-springs form the subject of an interesting article by Mr. A. Vaughan Jennings (*Geological Magazine*). He notes the fact that, sixteen centuries ago, Bad Nauheim was a Roman sanatorium, its fame arising from the small natural springs of thermal water. During the present century several borings have been made to largely increase the supply of water; the last one, made in 1855, was carried to a depth of 180 metres. The water appears to be pent up in a basin of Devonian rocks covered by Tertiary strata. The author discusses the source of the water, its temperature and saline ingredients.

THE Essex Field Club has issued, as No. 4 of its museum hand-books (price 2d.), a sketch of the crag formation of East Anglia, by Mr. W. H. Dalton.

WE have received Nos. 21 and 22 of *Spelunca*, or *Bulletin de la Société de Spéléologie*, which contains a variety of information about caves and water-channels, with notices of recent publications.

THE growth and retreat of Norwegian glaciers is dealt with by Mr. J. Rekestad (*Norges Geol. Undersøgelse*, No. 4). He draws attention to the evidence of great fluctuations in the amount of ice extending over periods of at least two hundred years, and remarks that these periods of general increase or decrease are accompanied by minor oscillations in the glaciers.

MR. R. BULLEN NEWTON has described some marine mollusca from the Upper Trias in the Malay Peninsula. These include the well-known and widely distributed *Chlamys (Pecten) valoniensis*, as well as species of *Pleurophorus*, *Myophoria*, &c., which indicate the horizon of the Rhaetic beds (*Proceedings*, Malacological Soc., Oct. 1900).

THE newly-appointed Government Geologist of Queensland, Mr. W. H. Rands, has forwarded a copy of the annual progress report of the Geological Survey for 1899. He takes occasion to express the general feeling of regret at the resignation of his predecessor, Mr. R. L. Jack. The report, which deals mainly with copper, gold, and coal properties, includes contributions by Mr. B. Dunstan on the occurrence of oriental ruby in northern Queensland, and on fire-clay.

CANON SCOBELL contributes to the *Proceedings* of the Cotteswold Club (vol. xiii. part iii.) some interesting notes on the common fields at Upton St. Leonard's, and these are accompanied by a view of lynchets, which indicate the ancient system of ploughing in strips and terraces. In some excursion notes Mr. S. S. Buckman deals with river features in the phraseology used by Prof. W. M. Davis. He refers also to the tunnel near Chipping Sodbury on the South Wales direct railway, to the water therein encountered, and to the probable effects consequent on its diversion by pumping.

TO the *Bulletin* of the American Geographical Society, vol. xxxii., 1900, Mr. R. L. Barrett contributes an interesting account of the Sundal drainage system in central Norway. The author explains the curious "reversal of drainage" which has occurred in this region, and deals with the question of the "hanging valleys" and erosion by overflowing glaciers.

IN a paper brought before the Academy of Sciences of Cracow, Mr. L. Marchlewski has described a new derivative of chlorophyll. This substance, which its discoverer has named phyllorubine, differs considerably from the previously known

phyllorubine, another chlorophyll derivative. While the spectrum of the latter is distinguished from that of other chlorophyll derivatives by having no band in the red region, phyllorubine forms no such exception. The new substance has not yet been obtained in the crystalline state.

THE action of chemical solutions on the lower forms of life is the subject of two papers in German in the *Journal* of the College of Science, Imperial University of Tokio—one, by N. Ōno, dealing with their effect on the growth of algae and fungi, while the other, by Prof. Atsushi Yasuda, treats of the adaptability of infusoria to concentrated solutions. The former author finds that certain poisons in a highly diluted state favour the growth of the lower algae, that smaller "doses" are required with algae than with fungi, that mercury chloride and copper sulphate in certain degrees of dilution favour the growth of fungi (a remarkable result, seeing that corrosive sublimate in stronger concentration is used as a preventive of mildew), and that spore-formation is retarded by certain chemicals. Prof. Yasuda, on the other hand, finds that infusoria are affected by a much lower degree of concentration than algae and fungi, even the most resistive species, *Euglena viridis*, being unable to exist on any but relatively weak solutions. An account is given of the physiological changes which take place in the organisms as the degree of concentration is varied.

A PRELIMINARY note on the fungi collected in the Belgian Antarctic Expedition is contributed to the *Bulletin de la Classe des Sciences* of the Belgian Academy by Mesdames Bommer and Rousseau. Almost all of these come from Tierra del Fuego. One species alone was found in Dango Land, i.e. the Antarctic region proper; but this species has not been classified, as it is represented only by a sclerotium, without carpophore. Among the fungi of Tierra del Fuego, out of fifteen species collected ten were new.

DR. GEORGE NEWMAN's book on "Bacteria," published a year ago in Mr. John Murray's Progressive Science Series, and reviewed in these columns (vol. ix. p. 434, September 7, 1899), has met with the success which its excellence deserves. A new edition has been issued, with additional matter, including new chapters on tropical diseases and on the bacterial treatment of sewage.

THE second volume of the new edition of the well-known "Gardener's Assistant," which has been revised and entirely remodelled under the direction and general editorship of Mr. William Watson, of the Royal Gardens, Kew, has just been issued by the Gresham Publishing Company. The work, so far as it has gone, is thoroughly in touch with the spirit of modern gardening, and should be in the hands of every practical horticulturist.

MESSRS. WILLIAMS AND NORGATE's *Book Circular* is known to many men of science as a useful guide to foreign scientific works, containing not only the titles and other publisher's particulars, but also notes describing the scope and character of the contents. Eight of these circulars, referring to works published during last year and this, have now been issued in volume form, and the book thus produced is a handy catalogue of important scientific publications which have lately appeared.

ANOTHER part of Engler's "Monographieen Afrikanischer Pflanzen-familien und-Gattungen" has been received; and in it Dr. K. Schumann deals with the African Sterculiaceæ. The work is being prepared, regardless of expense, under the auspices of the Berlin Academy of Sciences, and is published by W. Englemann, Leipzig. The trustees of the British Museum (Natural History) have just published a new part of the "Catalogue of the African Plants collected by Dr. Friedrich Welwitsch in 1853-61." This is the fourth (and concluding) part of Mr.

W. P. Hiern's description of the dicotyledonous plants collected by Dr. Welwitsch, the first having been published at the end of 1896.

THE *Bibliotheca Geographica*, edited by Dr. Otto Baschin for the Berlin Geographical Society, is known to be a most complete annual and international bibliography of geographical literature. The sixth volume of this catalogue contains the titles of papers published during 1897, classified into the usual groups according to subjects, and with an authors' index. It is thus possible to find, without the slightest difficulty, what papers upon any particular district or branch of geography were published in 1897, or to look up the list of publications of any writer on geographical subjects. The volume contains 444 pages, and it does credit to the editor and the society under whose auspices it has been prepared.

THE additions to the Zoological Society's Gardens during the past week include a Lioness (*Felis leo*) from East Africa, presented by Major T. Soutar, Cameron Highlanders; a Sooty Mangabey (*Cercocebus fuliginosus*, ♂) from West Africa, presented by Major G. McMicking, commanding C.I.V. Field Battery; two Ostriches (*Struthio camelus*), a Nilotic Crocodile (*Crocodilus niloticus*) from East Africa, presented by Mr. G. Marsden; an Egyptian Jerboa (*Dipus oegyptius*) from North Africa, presented by Mrs. R. Gurney; a Barn Owl (*Strix flammea*), British, presented by Lady Hutt; a Leopardine Snake (*Coluber leopardinus*), a Tesselated Snake (*Tropidonotus tessellatus*), European, presented by Mr. W. J. Wintle; a Grey-cheeked Mangabey (*Cercocebus albigena*, ♂), a Sooty Mangabey (*Cercocebus fuliginosus*, ♀) from West Africa, a Moustache Tamarin (*Midas mystax*) from the Upper Amazons, a Yellowish Capuchin (*Cebus flavescens*) from South America, two Tenrecs (*Centetes ecaudatus*), a Short-nosed Tenrec (*Ericulus setosus*), a Long-nosed Tenrec (*Hemicentetes semispinosus*) from Madagascar, a Festive Amazon (*Chrysotis festiva*) from Guiana, two Tui Parrakeets (*Protophytes tui*), a Hawk-headed Parrot (*Derophtus accipitrinus*) from Brazil, deposited; two Grey Squirrels (*Sciurus griseus*, var.) from North America, purchased; a Bosch-bok (*Tragelaphus sylvaticus*, ♂), eight Moccasin Snakes (*Tropidonotus fuscatus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF THE INFRA-RED SPECTRUM OF THE SOLAR CORONA.—In a recent issue of the *Comptes rendus* (vol. cxxxi. pp. 658-661). M. Deslandres describes some of his latest experiments in connection with the detection of the solar corona at ordinary times without the intervention of an eclipse. All the methods adopted prior to 1894 had been modifications of spectroscopic examination, using either the visual or ultra-violet rays, and were probably unsuccessful owing to the great proportion of these radiations existing in our general sky illumination, thereby diluting the small direct coronal light. In 1894 M. Deslandres found evidence that the sky radiation was very poor in the infra-red region, while the corona emitted this light abundantly, and this has since been investigated by Prof. Hale, in 1895, without producing any confirmatory results. M. Deslandres here suggests, however, that this non-success may have been due to those experiments having been made near the period of maximum sunspot activity, at which time the corona is much more uniformly distributed round the limb than at periods of minimum.

During the last eclipse, in May 1900, the author, in conjunction with M. Charbonneaux, found that the infra-red coronal radiation was some one-half or one-third the radiation of the same part of the sky after the eclipse, and the work has since been continued daily at the Observatory of Meudon with the same apparatus. This consists of a mirror 0.30 metre aperture and 1.50 metres focus, a slit spectroscope with crown lenses and prisms, a sensitive Melloni or Rubens thermopile, and a very sensitive Deprez d'Arsonval galvanometer. The slit of the spectroscope was 12 mm. long and 1 mm. wide, the prism train being so arranged that the thermopile only received the infra-

red radiation from $\lambda 1^{\circ}$ to $\lambda 1^{\circ} 8$. The slit has also been replaced by circular apertures of 4 mm. and 1 mm. diameter.

The interesting conclusion is that, at all times of the day, the sum of the deviations along the equatorial region has always been greater than the corresponding sum of the readings in a polar direction. As it is improbable that the diffuse heat of our atmosphere would be unequally distributed over the small area corresponding to the angular diameter of the sun, this difference can only be attributed to the effect of the corona; the present time being a minimum of spots, the greater action along the equatorial region is in agreement with the known conspicuous equatorial extensions of the coronal streamers and the comparatively small polar plumes. Many variations in the disposition of the apparatus have been made to discover any possible systematic errors, but the results have throughout remained the same.

In contrast with the above report should be considered the preliminary statement of the results obtained by the expedition organised by Prof. S. P. Langley from the Smithsonian Institution during the same eclipse (*Astrophysical Journal*, vol. xii. pp. 69-76). The light given from a 17 inch siderostat mirror passed to a concave speculum 50 cm. diameter and 1-metre focus. Arrangements were made whereby either the full image of a part of the solar surroundings could be allowed to fall on the bolometer strip, or the light previously passed through a prism, thus sifting out any particular radiation for action on the bolometer.

Settings on the inner corona gave a distinct negative deflection with respect to the zero of the instrument, but this was numerically less than the deflection given by a setting on the centre of the dark moon; this shows that the coronal radiations were recognised by the bolometer, giving some 5 mm. deflection greater than that of the dark moon.

The fact of the negative deflection, however, indicates that the radiation reflected by the earth's atmosphere during the partial phase is vastly more intense than that of the corona. Also "the corona is effectively cooler than the bolometer, and appears, therefore, neither to reflect much light from the sun, nor, chiefly by virtue of a high temperature, to give light of its own, but seems rather to be giving light in a manner *not associated with a high temperature*, or at least with the preponderance of infra-red rays usual in the spectra of hot bodies."

ANNUAL REPORT OF THE MELBOURNE OBSERVATORY.—In the thirty-fourth annual report of the Melbourne Observatory, Mr. P. Baracchi, the acting Government astronomer of Victoria, summarises the work accomplished at the institution during the period March 1, 1899, to March 31, 1900. With the 8-inch transit circle the total number of right ascension observations was 3311, and of north polar distance 2406. Of the latter, 1435 were on stars selected from the astrophotographic catalogue plates, to serve as fundamental stars for the reduction of these plates. 786 observations of heliometer stars were made at the request of Dr. Gill, and have been sent to him for comparison. The computations for the third Melbourne General Catalogue of 3100 stars are about two-thirds completed. The astrophotographic work has made considerable progress, the two series of catalogue plates and the series of chart plates with single exposure of one hour having been completed with the exception of a few scattered regions. Catalogue plates for regions above 80° of declination are being duplicated, and the second series of chart plates, with triple exposure of 30 minutes each, has been commenced, giving three images of each star about $8''$ apart. The measurements of the catalogue plates taken at this observatory and the Sydney Observatory have been made at Melbourne, and the progress made is stated in a joint report by Messrs. H. C. Russell and P. Baracchi. The first twelve months of the existence of the measuring bureau (commencing November, 1898) were occupied in preliminary instrumental experiments and training of observers, but during the last four months systematic measurement has been carried on. Several new micrometers have been obtained, one by Repsold, similar to that used by Dr. Gill at the Cape. This has double slides, and thereby permits quicker measurements. At present two observers, relieving each other for alternate periods of one hour, measure in a day about 500 stars with the Repsold and about 400 with the local micrometer. As the total number of stars on the Sydney and Melbourne plates is probably 1,500,000, it is estimated that with three efficient measuring machines, and six observers employed from six to seven hours daily, the whole may be accomplished in some six or seven years. The photoheliograph, great telescope